FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Chris Coons
Ranking Member
Subcommittee on Financial Services and General Government
Committee on Appropriations
United States Senate
125 Hart Senate Office Building
Washington, D.C. 20510

Dear Senator Coons:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,

Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

P.S. Senator, I hope all is well with you. Please don't hesitate to get in touch if I can be of assistance - especially with respect to the GO Act.

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Elijah E. Cummings
Ranking Member
Committee on Oversight and Government Reform
U.S. House of Representatives
2471 Rayburn House Office Building
Washington, D.C. 20515

Dear Congressman Cummings:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

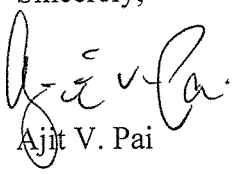
I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,



Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Trey Gowdy
Chairman
Committee on Oversight and Government Reform
U.S. House of Representatives
2157 Rayburn House Office Building
Washington, D.C. 20515

Dear Chairman Gowdy:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

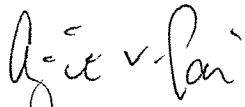
I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,



Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Tom Graves
Chairman
Subcommittee on Financial Services and General Government
Committee on Appropriations
U.S. House of Representatives
2000 Rayburn House Office Building (G Floor)
Washington, D.C. 20515

Dear Chairman Graves:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,

Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

P.S. Congressman, hope all's well with you in the New Year! Please don't hesitate to get in touch if I can be of assistance. (And sorry about Georgia in the championship game.)

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Ron Johnson
Chairman
Committee on Homeland Security and Governmental Affairs
United States Senate
340 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senator Johnson:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,

Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Claire McCaskill
Ranking Member
Committee on Homeland Security and Governmental Affairs
United States Senate
442 Hart Senate Office Building
Washington, D.C. 20510

Dear Senator McCaskill:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

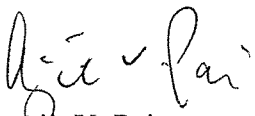
I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,



Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Bill Nelson
Ranking Member
Committee on Commerce, Science, and Transportation
United States Senate
425 Hart Senate Office Building
Washington, D.C. 20510

Dear Senator Nelson:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

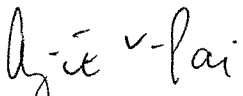
I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,



Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Frank Pallone
Ranking Member
Committee on Energy and Commerce
U.S. House of Representatives
2322A Rayburn House Office Building
Washington, D.C. 20515

Dear Congressman Pallone:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,

Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Mike Quigley
Ranking Member
Subcommittee on Financial Services and General Government
Committee on Appropriations
U.S. House of Representatives
2000 Rayburn House Office Building (G Floor)
Washington, D.C. 20515

Dear Congressman Quigley:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,

Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable John Thune
Chairman
Committee on Commerce, Science, and Transportation
United States Senate
254 Russell Senate Office Building
Washington, D.C. 20510

Dear Chairman Thune:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,

Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Greg Walden
Chairman
Committee on Energy and Commerce
U.S. House of Representatives
2322A Rayburn House Office Building
Washington, D.C. 20515

Dear Chairman Walden:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,

Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
THE CHAIRMAN

January 26, 2018

The Honorable Shelley Moore Capito
Chairwoman
Subcommittee on Financial Services and General Government
Committee on Appropriations
United States Senate
184 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Chairwoman Capito:

On November 16th, 2017, the Government Accountability Office (GAO) publicly released a report entitled *INTERNET OF THINGS: FCC Should Track Growth to Ensure Sufficient Spectrum Remains Available*. In pursuit of an objective to ensure that the spectrum needs for the Internet of Things are met, the report recommends that the FCC should track the growth in (1) high-bandwidth IoT devices and (2) IoT devices that rely on unlicensed spectrum.

I concur that the FCC should ensure that adequate spectrum is available to support continued American wireless innovation benefiting all members of our society. The agency is now taking an all-of-the-above approach to spectrum, and we are striving to expand access in low-, mid-, and high-band spectrum to support licensed and unlicensed applications. In 2017 alone we completed the Broadcast Incentive Auction, finalized rules for access to high-band spectrum in our Spectrum Frontiers proceeding, and began an examination of whether the rules governing 3.5 GHz or other mid-band spectrum can be reformed to improve its use. Any of the spectrum bands made available through these actions could be used for IoT as well as for any other application as determined by market need.

In addition to IOT, Internet access, messaging, voice calling, video content, emergency services and a wide variety of applications contribute to the growing demand for spectrum. To determine overall spectrum trends, FCC staff rely upon a variety of sources: industry reports on technology, emerging applications and the growth, and the type of network traffic; information developed through our experimental licensing and equipment authorization processes; consultation with other, relevant federal agencies as well as with foreign regulatory agencies; utilization of industry advisory groups to the FCC; and continual meetings with innovators, wireless service providers, industry representatives and standards groups to better understand spectrum needs and related technologies.

I should note that, in our experience, simply knowing the *numbers* of high bandwidth "Things" produced or tracking the numbers of IOT devices that rely on unlicensed spectrum does not correlate in a meaningful way to the *spectrum impact* of such devices. For example, knowing the number of cameras that can send images provides little or no information regarding their spectrum usage without information such as the resolution of the images, the transmission technique employed or how often transmissions occur. Moreover, there is little distinction between an application such as a video baby monitor using Wi-Fi and an over-the-top video

program delivered via Wi-Fi to a TV or other device in the home.

We are continuing to provide spectrum under our flexible use policies that can be used for IOT and many other uses. Using the sources I have described, we will continue to track the growth and evolution of IOT as well as other wireless applications and ensure that IOT spectrum needs together with those of the many services supported by the nation's wireless infrastructure will continue to be met.

I appreciate the opportunity to comment on the GAO Report and I would be happy to discuss this issue further if you have any questions.

Sincerely,

Ajit V. Pai

cc: The Honorable Darrell Issa
The Honorable Suzan K. DelBene

P.S. Senator, great to see you recently! Thanks for taking the time (and that goes for your terrific team, too).